



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,720	06/19/2001	Richard R. Hengst	6096-01	2520
26614	7590	02/24/2005	EXAMINER	
PEPE & HAZARD, LLP 225 ASYLUM ST. HARTFORD, CT 06103			KACKAR, RAM N	
			ART UNIT	PAPER NUMBER
			1763	
DATE MAILED: 02/24/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/884,720

Applicant(s)

HENGST, RICHARD R.

Examiner

Ram N Kackar

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4,6,9,11-27,29,30 and 32 is/are pending in the application.
- 4a) Of the above claim(s) 17-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6,9,11-16,29,30 and 32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/2/2004 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 6, 11-15, 29-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richard R Hengst (US 5931666) in view of Lu et al (US 5904778) as evidenced by Breidenbach et al (US 5562774) and Hotate et al (US 5448418).

Hengst et al disclose a vertical wafer boat with plurality of support rods for supporting plurality of silicon wafers having ceramic body of siliconized SiC (Col 5 line 42-45), having ceramic coating of SiC to prevent migration of impurities (Col 5 line 32-45) and surface roughness to prevent slip of less than 1  $\mu\text{m}$  (Col 4 lines 14-22), horizontal base, top plate, support rods, plurality of slots, each having ceramic coating and surface finish (Fig 1).

Hengst et al disclose ceramic coating of silicon carbide but do not disclose its thickness.

Art Unit: 1763

Lu et al disclose that protective SiC coating of 100 $\mu$ m or less were well known (Col 6 line 21-23). Hotate et al, incorporated by Lu et al (Lu et al - Col 6 line 17) teaches that too thick coating of CVD-SiC on SiC base may develop defects due to occlusion of particles (Hotate et al- Col 1 lines 20-25). Hotate et al further teach that coatings 30-300 micron are preferable (Col 2 lines 8-13).

While Hotate et al teach the desirability of having the film thin in the context of the particular situation of SiC film over SiC, it is well known in general that thick films compared to thin films may have less adhesion. Breidenbach et al teach (Col 1 lines 12-16) that thicker films flake off easily. This observation is known and documented extensively in the art.

Therefore it would have been obvious for one having ordinary skill in the art at the time invention was made to have a thickness of less than 100 microns because too thick a layer may have problems due to a tendency to peel and acquire other defects and too thin layer may not provide adequate protection.

4. Claims 1-4, 6, 9, 11-15, 29-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inaba et al (JP 11016993) which later became (US Patent 6093644) in view of Lu at al (US 5904778).

Inaba et al disclose a vertical wafer boat for supporting silicon wafers having ceramic body (Fig 1 and Col 1 line 34) having ceramic coating to prevent migration of impurities (Col 1 line 20) and surface finish over the coating to prevent slip in substrates of large diameters (Col 1 line 20) and at high temperature (Col 1 line 13), maximum roughness of the finish less than 10  $\mu$ m and an impurity of less than 0.1 ppm (Col 3 line 14 and 15), horizontal base (Fig 1-13), top plate (Fig 1-12), support rods (Fig 1-11) and plurality of slots (Fig -14), each having ceramic

Art Unit: 1763

coating and surface finish (Col 2 line 47). Inaba et al disclose that the ceramic body could be Si-SiC (Col 4 lines 24-27)

Inaba et al disclose ceramic coating of silicon carbide but do not disclose its thickness.

Lu et al disclose SiC coating on sintered Silicon carbide being 100 $\mu$ m or less (Col 6 line 21-23).

Therefore it would have been obvious for one having ordinary skill in the art at the time invention was made to have a thickness of less than 100 microns because too thick a layer may have problems due to a tendency to peel and acquire other defects and too thin layer may not provide adequate protection.

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inaba et al (JP 11016993) in view of Lu et al (US 5904778) as applied to claims 12 or Richard R Hengst (US 5931666) in view of Lu et al (US 5904778) as applied to claims 12 and further in view of Larry S Wingo (US 6171400).

Inaba et al or Richard R Hengst both, disclose a vertical wafer boat for supporting silicon wafers having ceramic body but do not disclose a stress relief slot and location notch.

Wingo discloses wafer boat having both stress relief slot and notches at the base (Fig 1).

Therefore it would have been obvious for one having ordinary skill in the art at the time invention was made to use the teaching of Wingo so as to be able to avoid problems due to thermal expansion and be able to place the boat correctly on processing platform.

***Response to Amendment***

Applicant's arguments filed 12/02/2004 have been fully considered but they are not persuasive.

The applicant argues that one of ordinary skill in the art at the time of invention would not have looked at Lu et al to set the thickness of coating in Hengst since Lu et al is directed to a different discipline than that of Hengst.

Lu et al is directed to a semiconductor processing equipment and its teaching of protective layer of CVD- SiC is relevant to both etching as well as deposition since both may present corrosive and contaminating environment to components exposed to them and a protective coating may be advantageous in both cases.

The applicant argues that there is no support for the assertion that thicker layer may have a tendency to peel except in the applicants own disclosure.

This issue is addressed above in the rejection.

The applicant argues that Hengst fails to teach surface finish of less than 1.0 micron in the context of ceramic coating. The applicant further argues that Hengst discloses the surface finish less than 1.0 micron merely in passing.

Examiner disagrees.

Hengst has extensively studied the issue of slip as related to surface finish and teaches the reason of why low roughness is advantageous (Col 4 lines 14-22). To dismiss it as "in passing" seems inappropriate. To say that Hengst has not disclosed this in context of CVD SiC layer is also not correct since the relevant issue is only roughness and it is discussed in the context of CVD coating too (Col 5 lines 37-40).

Art Unit: 1763

Regarding the additional limitation of silicon impregnated silicon carbide, both Hengst (siliconized) and Inaba et al (Si-SiC) disclose a composite of silicon and Silicon Carbide. Since this is product by process claim its determination of patentability is based on the product itself and not on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 571 272 1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



AU 1763.